

GROWING Points

Department of Environmental Horticulture • University of California, Davis

The State of Environmental Horticulture in California: a White Paper for UC-DANR

by Dave Burger (UCD), Vic Gibeault (UCR) and Pam Geisel (UCCE)



<http://envhort.ucdavis.edu>

Editor's note: In the process of planning budget and staffing needs for the next five years, officials of the University of California's Division of Agriculture and Natural Resources (UC-DANR) requested input from UC personnel involved in environmental horticulture programs. Michael Reid, Program Leader for Agricultural Productivity, specifically requested information regarding priority issues, current resources, and anticipated resource and staffing needs for the statewide environmental horticulture program. The following white paper was presented at a meeting of UC officials in September. Other UC personnel who contributed to the document include Jim Downer, Don Merhaut, Larry Costello, Mario Moratorio, Vince Lazaneo, Heiner Lieth, Paul Vossen and Dave Shaw.

Perspective

Environmental horticulture is defined as that segment of agriculture involving the **production, utilization, management and maintenance of plants** that enhance human activities. The environmental horticulture industry in California provides jobs for hundreds of thousands and benefits for essentially all Californians. Other terms besides environmental horticulture have been used to define and describe this subject matter area. *Urban horticulture* is used when the focus is on those activities related to home horticulture which includes home landscapes and gardens, home food production and community and school gardening in and around populated areas. *Ornamental horticulture* is used to describe the use of plants primarily for home and landscape beautification. *Landscape horticulture* encompasses plant management and maintenance and *The Green Industry* is used to include all people, products and services that grow, build, maintain and sell plants that make up California's landscapes. Environmental horticulture is an inclusive term that most accurately describes all areas here: floriculture, landscape horticulture, nursery production, turfgrass management, urban forestry and urban horticulture.



Dr. Vic Gibeault, UCCE Environmental Horticulture Specialist, relates the results of buffalograss variety trials to clientele during a recent Turfgrass Field Day at UC Riverside.

Vision

Environmental horticulture is and will continue to be a vital part of everyday life in California. Environmental horticulture will involve sustainable production systems and landscape practices that are fully integrated into the daily lives of California residents. As the state's population continues to grow and our urban areas continue to expand people want to maintain a connection with nature; therefore, environmental horticulture production, service and management activities will fit seamlessly into our daily lives to enhance our health and sense of well-being. Our quality of life is closely linked to the quality of the urban environment (e.g., parks, recreation areas, yards, and streets); environmental horticulture leads the way in protecting, enhancing, and sustaining these quality of life elements in the urban environment. UC-DANR can play a major role in environmental horticulture by investing resources in the creation and distribution of new knowledge that will enhance the lives of all Californians. In order to achieve the vision of a sustainable environmental horticulture system, we must provide the leadership and direction for collaboration with industry, other institutions

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as well as with the individuals. Through the interdependence of research, extension and public service we can create an environment grounded in science and guided by community need and global awareness.

This vision is supported by:

- a collection of outstanding research and extension personnel housed throughout the state
- an organization that encourages a better understanding of the world around us
- sound planning to address current challenges and foresee those yet to come
- informed leadership responsive to the needs of others

Importance of Environmental Horticulture to California

Environmental horticulture is an important component of California's agribusiness community providing myriad benefits to the state's populace and economy. With the ever-increasing urbanization of the state, some aspect of environmental horticulture touches the vast majority of California residences on a daily basis. A recent critical evaluation of the impact environmental horticulture has on the state's economy showed that Californians spent \$8.5 billion on environmental horticulture and generated \$10 billion of environmental horticultural sales in 1995 (most recent year for complete data sets) (Templeton *et al.*, 2000). These sales supported **129,000 jobs** and translated into **\$7 billion in household income**. Landscapes for environmental horticulture covered 554,000 hectares in the state in 1995. When indirect effects of tourism are included the economic impact and importance of environmental horticulture nearly doubles.

Recent production statistics from the California Department of Food and Agriculture show that nursery crops and flower and foliage crops both rank in the top 10 of California's Farm Products. In 1998 (most recent data) nursery products ranked 3rd with a total income of \$1.75 billion and flower and foliage crops ranked 9th with an income of \$769 million. Taken together this production-only segment of environmental horticulture has a total income of more than \$2.5 billion making it the largest plant commodity segment in California agriculture (milk and cream are \$4.3 billion and all grapes are \$2.4 billion). **California's nursery and flower/foliage crops ranked #1 in the United States both commanding 22% of U.S. production.**

To complement the production areas in environmental horticulture, the May-June, 1991 issue of DANR's *California Agriculture* (Pittenger *et al.*, 1991) described and then organized environmental horticulture services into component parts. These included research and education, retail sales, design, installation and maintenance, public agencies (e.g., CalTrans, state parks, municipal parks, schools and public buildings), golf courses, cemetery districts and amusement parks. These researchers concluded that the environmental horticulture industry had an economic impact of \$7.2 billion with \$1.9 billion of that due to production (Pittenger *et al.*, 1991). If the same ratio between total economic impact and that attributable to production exists today (9 years after their study), **the total economic impact of environmental horticulture would be \$9.5 billion!**

Beyond these purely economic impacts, environmental horticulture products, services and activities enhance our physical, psychological, sociological and emotional well-being. These impacts may take the form of recreational opportunities (e.g., parks, golf courses), quicker convalescence from surgery (Ulrich, 1984), reduced stress and therapeutic applications (Relf, 1981), higher workplace productivity (Beard and Green, 1994) and increased opportunity to introduce science-based education to adults and youth. Based on research conducted by the USDA-FS Western Center for Urban Forest Research and Education, vegetation in and around homes and businesses saves energy, reduces airborne pollutants and particulates, reduces flooding hazards, absorbs CO₂ from the atmosphere and adds to property values. Urban forests contributed to local communities in significant ways; Western Center scientists found that **each mature urban tree contributed \$18.00 of net benefit to the economy**. The science of quantifying these types of impacts of environmental horticulture is in its infancy, yet all of us have had the experience of feeling a sense of peace and tranquility in a beautifully landscape garden or the pleasing aroma of freshly cut grass or the joy of giving or receiving a dozen long-stemmed roses. Future research will reveal how these experiences affect us and to what extent.

There is no doubt this area is important to the state of California and that UC-DANR needs to play a leadership role in providing research-based information to those in need (industry clientele, government agencies, educational institutions, non-profit organizations, civic groups and the general public).

Critical Issues

One of the challenges facing environmental horticulture interests in the state is the variety of target audiences looking for science-based information and solutions to their problems. Environmental horticulture audiences range from the small cut flower producer to the research director at a major nursery to the horticulturist at CalTrans to the landscape contractor to the municipal arborist to the individual homeowner. Each of these individuals represents important aspects of the environmental horticulture industry and deserve the attention of UC-DANR professionals. Research and extension programs in environmental horticulture have to be keenly aware of who the end-user is of the information being developed and distributed. In addition, when critical issues arise or when problems present themselves, they are addressed or solved differently depending on the group(s) affected.

Issues currently facing environmental horticulture interests in the state are myriad and widespread. Many of these issues will directly

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Research Updates on Insect Pests

Progress on biological control for the Red Gum Lerp Psyllid

The red gum lerp psyllid (RGLP) first appeared as a pest of eucalyptus in Southern California in 1998. As of September, 2000, all counties in California have reported its occurrence except those in the extreme north. These tiny insects, also native to Australia, suck sap from leaves causing leaf drop, branch dieback and even death of weakened trees. The psyllids also produce honeydew as waste, a sticky substance that falls from infested trees on cars and sidewalks. The nymphs (immature form) of RGLP form distinctive "lerps" on eucalyptus leaves which appear as small white bumps and are actually protective covers secreted by the insects developing inside. This aspect of the insect's biology makes the use of chemical pesticide sprays impractical and the need for biological control imperative.

Several native predators have been observed feeding on RGLP, including lady beetles, minute pirate bugs, lacewings, syrphid flies, spiders and birds. Their occasional feeding, however, is not enough to bring the insect under control. In August 1999, Dr. Donald Dahlsten of UC Berkeley searched for natural enemies of RGLP in Australia and returned with eight species of encyrtid parasitoid wasps.



photo by Jack Kelly Clark

Exit holes of RGLP parasitoids. If your lerps look like this, chances are biological control is working.

The wasps, which are tiny and pose no threat to humans or animals, were reared and tested in a quarantine facility and one species, *Psyllaephagus bliteus*, appears

to be a good candidate for biological control. The female wasp lays an egg in the body of a psyllid nymph. When the egg hatches, the wasp larva consumes the psyllid nymph. It subsequently develops into an adult and emerges from a hole in the lerp to fly away and start the cycle again.

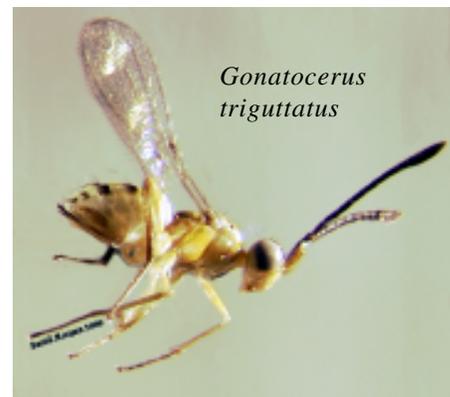
The parasitoid wasps were first released in Los Angeles in June 2000. In August, a wasp was recovered in a trap in Redwood City that had probably traveled eleven miles from the release site in Alameda County. This would suggest that the parasitoid is capable of spreading and, over time, may bring the red gum lerp psyllid infestation under control to nondamaging levels. Find out more at:

<http://www.cnr.berkeley.edu/biocon/dahlsten/rglp/index.htm>

Spread and biological control for the Glassy-Winged Sharpshooter

The glassy-winged sharpshooter (GWSS), native to the southeastern United States, was first found in California in 1990. It is a large, sap-sucking insect, almost a half-inch in length, and receives its name from its transparent wings. GWSS can fly up to one-quarter of a mile, frequently appears in high numbers and is able to survive winter temperatures dipping as low as 20 degrees Fahrenheit. These characteristics make it an effective vector for Pierce's disease, a bacterial infection of grapes and other plant species causing blockage of the xylem, the water- and nutrient-conducting vessels of plants. The typical symptom is dry or scorched leaves and infected vines can die in as little as one to two years. The disease is spread from plant to plant by the activity of sap-sucking insects, such as sharpshooters, that take the bacteria into their bodies as they feed and introduce them into uninfected plants as they continue feeding. An adult GWSS carries the bacterium in its mouthparts throughout its six-month lifespan.

Pierce's disease has existed for more than 100 years in California, but its spread



Gonatocerus triguttatus
Parasitic wasp for biological control of GWSS

was limited by the weak flying ability of the principal carrier, the blue-green sharpshooter, able to fly only about three feet. The appearance of the more effective GWSS vector poses a serious threat to the state's grape industry and could be responsible for transmitting disease caused by the same organism in other plant species including almond, peach, citrus, alfalfa, oleander and many ornamentals.

GWSS has spread from the initial infestations in Southern California and is moving northward. Infested counties range from San Diego to Fresno, and the insect has recently been found in urban parts of Sacramento and Butte counties. State and federal funds totaling \$36 million have been dedicated to eradication efforts. Researchers are investigating currently available pesticides for effective control of sharpshooter populations, the use of physical barriers to prevent spread of GWSS and biological control using a natural enemy (a tiny stingless wasp) that is successfully reducing populations of the sharpshooter in Mexico and Texas.

Dr. Mark Hoddle of UC Riverside led the seven-month breeding and quarantine program for this important biological control agent. The wasp is an egg parasite, laying its eggs within sharpshooter eggs. The wasp larvae that hatch eat the contents of the sharpshooter eggs and emerge as adults to repeat the cycle. Releases have been made in Riverside, Ventura, Kern, Tulare and Fresno counties.

A GWSS workshop is being held on November 16, 2000 at the Riverside Convention Center (<http://www.ucr.edu/news/gwss/>) to present current information and options for control. GP

New Teaching Video Available from UC Agriculture and Natural Resources: Training Young Trees for Structure and Form

A new video is now available from UC's Agriculture and Natural Resources publication catalog, titled "Training Young Trees for Structure and Form" (#V99A). Developed by UC Cooperative Extension Horticulture Advisor, Larry Costello, for professionals in the tree care industry, this training video will be a valuable learning tool as we approach the winter pruning season. The following synopsis and review of the video appeared in a recent issue of *Western Arborist* magazine.

SYNOPSIS

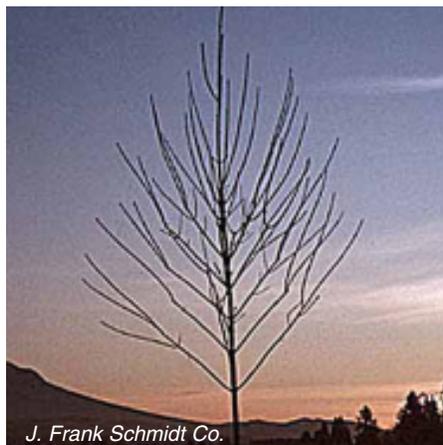
This instructional videotape was developed to teach the basics of pruning young trees. It documents a 5-step process for training young trees. The video, shot over a 4-year period, shows the annual pruning response of young Raywood ash (*Fraxinus oxycarpa* 'Raywood'), Norway maple (*Acer platanoides*), southern live oak (*Quercus virginiana*), and sweetgum (*Liquidambar styraciflua*). In addition, trees that were either not pruned or pruned incorrectly are shown. To illustrate how to prune trees for clearance the video takes you to trees along streets, in parking lots, and parks and yards.

The video covers all the pertinent questions related to pruning young trees. It emphasizes three primary reasons to train young trees: improve structural strength, reduce maintenance costs, and increase tree longevity. It provides guidelines on how much to prune and when to prune. Pruning conifers requires some modifications to the 5-step process and these are presented. A 4-page supplement summarizes key points, contains a glossary and references, and lists 30 review questions.

The 38-minute video is available from University of California Publications and well worth the \$50 price (#V 99A). **Order by calling 1-800-994-8849 or on-line at: <http://anrcatalog.ucdavis.edu>**
-Greg McPherson, Western Center for Urban Forest Research and Education

PRACTITIONER'S PERSPECTIVE

This video addresses a longstanding need to make available a basic set of guidelines for training young trees. As the video points out, proper early training can increase tree safety and longevity while decreasing maintenance costs over the life of the tree.



The video is professionally done, with a variety of graphic and photographic techniques. As with many training videos, the teaching function is enhanced by providing a list of what will be taught, then referring back to the list as the video progresses, and then reviewing what has been learned. The video covers:

1. Introduction and background as to why we need to train trees.
2. The 5 steps of training.
3. Species differences in form and response to training.
4. Adjustments to training in different locations (i.e. parks vs. street trees).
5. Training conifers.

The video moves along quickly through the background portion showing various aspects of tree structure that increase failure potential, such as codominant stems or other weak attachments in mature trees. The training procedure is broken down into 5 steps:

1. Remove broken, diseased, dying, damaged limbs.

I noticed that the traditional inward or crossing limb removal was not included, and that is good. Any undamaged live and

vigorous branch may be useful in tree training and development.

2. Select a leader.

This focus is useful in directing attention to the vigor and growth pattern of existing branches. The problem of codominant stems is addressed forcefully — remove one!

3. Select the lowest permanent branch.

The video cleverly introduces the concept of changing one's training plan over time in response to tree growth. For example, it shows how one's choice of the lowest branch may change if a suitable new shoot arises.

4. Cut back and remove competing scaffold branches.

Selection and maintenance of the dominant scaffold branches is treated with the same care as selecting the leader.

5. Retain temporary branches as needed throughout the tree.

This section describes development of a multi-year training plan, and recognizes the value of temporary branches for trunk strengthening and shading.

The field demonstrations use typical trees in sites where growth is vigorous. The video shows 50% and 30% of foliage removed during the first and second years, more than many arborists might think appropriate. The effect is to direct most vigor into the selected branches, giving them a marginal advantage over vigorous sprouting shoots. It was thought provoking to see a Bradford Pear (*Pyrus calleryana* 'Bradford'), which usually develops a vigorous multibranch head, trained by this method into a dignified central leader form!

The emphasis throughout the video is "Take control of the tree – don't let its growth habit confuse your goal." The same plan applies to almost all trees, and this is a plus for beginners. Specialty forms such as pollarded and weeping trees are not included. The video stresses that the arborist's goal is to develop trees into forms that will withstand wind and rain and grace our landscapes for their maximum biological life, rather than be torn apart at a weak point due to lack of care in the formative years. It is a noble goal, and this video makes a valuable contribution toward achieving healthy and long-lived trees.

-Philip S. Evans, Assistant Director,
Plant Operations, San Francisco State
University



Notes From the Chair... By Dave Burger

The EH Department welcomed new and returning students with what is becoming the traditional **EH Fall Potluck** in early

October. Faculty, staff, students and their families feasted on lasagna and many other tasty dishes and desserts. A good time was had by all as seen in the photo below right.

Student News

An Environmental Protection Agency STAR Fellowship was awarded to **Thomas Rambo**, a new Ecology graduate student who is working with **Malcolm North** and **Michael Barbour**. A National Science Foundation Graduate Fellowship was earned by **Jeffrey Clary**, an Ecology graduate student who is working with **Truman Young**.

Visiting Scholars

Heiner Lieth is hosting **Carola Gonzalez** from Spain and she plans to work on the effects of temperature on timing of cut rose crops. Also joining the Lieth lab group is **Fritz-Gerald Schroeder** from the University of Applied Science, founded in 1992 in Dresden, Germany (www.htw-dresden.de). He is joined by his wife, Anke, and two of their three sons and they plan to stay until June 2001. Dr. Schroeder's research interests include greenhouse management and closed hydroponic systems.

New visitors to **Michael Reid's** lab include **Shimon Meir** from Israel who will be conducting postharvest research through the summer of 2001. **Fisun Celikel** is back from Yalova, Turkey for a brief visit to finish some manuscripts and do more postharvest research. **Mingfang Yi** from China will be joining the group in November.

New to **Alison Berry's** lab is **Jen-chih Chen**, a Ph.D. student in Plant Biology, who is studying glyco-proteins found in root nodules of certain woody plants that may be important in symbiosis with *Frankia* bacteria.

Faculty Activities

Richard Evans and **Don Merhaut**, Assistant Extension Specialist for Ornamental and Floriculture Crops at UC Riverside, are collaborating on at least two grants in the coming year. The Hansen Trust, a UC foundation funding agriculture research beneficial to Ventura County, has awarded them, along with Farm Advisor **Julie Newman**, \$16,000 to study water and nitrogen use efficiency in woody ornamental nurseries. The CDFA's Fertilizer Research and Education Program (FREP) has awarded Evans and Merhaut \$50,000 to examine water and nitrogen use during production of a large number of woody nursery crops. Richard is currently in Barcelona, Spain, spending a short sabbatical leave with **Robert Savé**.

On October 12, 2000, **Heiner Lieth** received the Henry E. Heiner Award from the Joseph H. Hill Memorial Foundation which is affiliated with the **International Cut Flower Growers Association (formerly Roses Inc)** during their annual meeting in Santa Barbara. The award is "for his outstanding research in support of the fresh cut rose industry".

Heiner was recognized by the ICFG for his research on modeling of rose productivity, his participation in educational programs and his work as an advisor to several association committees. Past recipients of this award include **Ray Hasek** and **Francis Aebi**. Heiner also recently received \$90,000 from USDA to develop mathematical models that describe the variables involved in greenhouse and nursery crop production systems. The three-year study will focus on how greenhouse crops use water and fertilizer nutrients. Developing models for these variables will enable growers to optimize fertilization, irrigation and run-off management practices.

Michael Barbour has received a grant of \$300,000 from the David and Lucile

Packard Foundation to do a state-wide survey of vernal pools that will result in a classification of vernal pool plant communities useful for conservation purposes. The work will begin this winter and continue for two years. Co-PIs are **Randy Dahlgren** and **Graham Fogg** of the Land, Air and Water Resources Department at UCD. They will study the hydrology and water chemistry of vernal pools, possibly showing that vernal pool water ultimately ends up as an important element in the volume of rivers flowing out of watersheds that have vernal pools.

Staff Happenings

We welcome **Laura Kemp** who has joined the staff of the Western Center for



The EH Fall Potluck was a big success

Urban Forest Research and Education as administrative assistant. We offer congratulations to **Kacey Donovan** who was married on October 7.

Finally, a sad note. **Kathleen Barsotti**, (MS Ecology, 1975) who studied with **Jim Harding** as **Kathy Barnes**, died this past summer at the age of 51. A pioneer in organic farming and small scale marketing, she was the proprietor of **Capay Valley Fruits and Vegetables** and a founding member of the **Davis Farmers' Market**. Kathy received the Small Farm Program 1999 Pioneer Agriculturist Award for her lifelong commitment to organic farming. This award will now be known as "The Kathleen Barsotti Pioneer Agriculturist Award" in her honor. 

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affect California residents living in urban environments. What follows is a list of issues we currently face and some we will face in the foreseeable future.

pests and diseases of greenhouse, nursery and landscape plants

- Red Gum Lerp Psyllid
- Red Imported Fire Ant
- Glassy-winged Sharpshooter
- Sudden death of urban oaks

competitiveness of cut-flower producers

- greenhouse growers are being forced out of business due to inability to compete with foreign imports. We can help many of these small farms be more competitive by providing them with information related to improved efficiency.

water availability for plant production and landscape irrigation

- water conservation
 - residential water use: The largest, single urban water-using group in California is the residential water users, who comprised about 58% of the statewide total of urban water use in 1990. (DWR Report Bulletin 160-93 California Water Plan Update). The largest users were the individual residential landscape areas that require irrigation. The ability for water to be conserved by home gardeners was limited only by their expertise in managing water through irrigation equipment selection, plant selection and an understanding of plant/soil/ water relations. This is where UC-DANR has been an important partner in water conservation efforts during past drought periods.
 - commercial water use: Considerable reduction in water use in commercial production of environmental horticulture crops is possible through better management of resources, sensing of moisture conditions, and decision support tools.

sustainable landscapes

- using minimal inputs of natural, human, and economic resources to maximize benefits of urban landscapes
 - Green waste management issues are and will continue to be critical
- safety issues surrounding pesticide applications and use in urban environments

water quality issues

- residential: home owners, as a group, discharge large quantities of fertilizers and pesticides into the environment. This can be reduced through research and education.
- commercial: commercial producers of greenhouse and nursery crops are coming under increasing regulatory pressure to reduce or eliminate the discharge of fertilizers and pesticides that enter the nation's waterways and aquifers. We need to assist this industry with information and technology to allow them to conform to the public's demands.

run-off and non-point source water pollution

- Federal and state governments are now implementing long-standing policies involving water pollution due to run-off. One major effort in California is the current Total Maximum Daily Load (TMDL) program.

impact of urbanization and urban sprawl

- UC-DANR has a huge reservoir of knowledge in agricultural systems. We also have a very large number of faculty who are world-renowned experts in natural systems. As well, we have a great deal of information on human social issues. Where many of these areas overlap is in the urban landscape and the interactions involving people in those landscapes.

invasive species

- protection and enhancement of native species in urban landscapes

UC-DANR's Competitive Edge

UC-DANR is in a strong position to provide statewide leadership in environmental horticulture. An analysis of UC-DANR's competitive edge shows that:

- UC-DANR personnel have the skill, training, and resources to conduct research in areas of need.
 - Other organizations/groups do not have the ability/resources to do this.



Farm Advisor Julie Newman prepares a demonstration of postharvest treatments for cut flowers at a grower/shipper facility.

- an extension infrastructure already exists
 - UC-DANR is able to develop a cohesive front on important issues with a focused message to the community because of the workgroup system that has been developed
- UC-DANR personnel are highly regarded and looked to for objective analyses of products, services and information
- UC-DANR personnel work closely with user clientele groups and public/government agencies who set policy (e.g., municipalities, state boards, water districts)
- however, **UC-DANR is below critical mass** to effectively address many important challenges faced by those interested in environmental horticulture in the state
 - key positions are vacant significantly compromising efforts to deliver programs and information to the California environmental horticulture industry and to Californians in general
 - rapidly expanding areas (e.g., San Diego county) do not have the advisor personnel necessary to meet the demand
 - there is sufficient need and work for a landscape or turf advisor in Los Angeles and Orange Counties
 - “new” production areas of California (e.g., central San Joaquin Valley, central coast, north coast) have few if any environmental horticulture advisors; more are needed there.
 - additional advisor support is warranted for the Sacramento area which is undergoing rapid urban expansion to the north and east

DANR's Current Resource Allocations

There is fewer than 14 environmental horticulture advisor FTE [Full Time Employee] in the entire UC-DANR. Two campuses, Davis and Riverside, house most of the CE Specialist and AES Faculty FTE. Davis has 1.67 CE Specialist (Floriculture) FTE and Riverside has 1.75 CE Specialist (Turfgrass and Nursery/Floriculture) FTE. UC-DANR has other special programs (e.g., Integrated Pest Management, Small Farms Center) that have some involvement in environmental horticulture statewide. Finally, the Ornamental Horticulture Extension Coordinating Conference (OHECC) and its associated workgroups (Floriculture and Nursery, Landscape, Turfgrass, Urban Horticulture) provide some framework for coordinating research and extension activities across the state.

New and Replacement Resource Needs

The list below includes positions that have been requested recently by the Davis and Riverside campuses along with positions that will be important to statewide environmental horticulture interests in the foreseeable future. In addition to increased FTE, there is a need for increased funding focused on environmental horticulture.

Personnel

- Landscape Specialists
 - Landscape Horticulture Specialist (UCD)
 - This position would: 1) serve as a statewide resource for County CE Advisors, the statewide Master Gardener program and state agencies, 2) coordinate problem-oriented research focused on sustainable urban landscapes and 3) conduct training in research methods and provide information regarding urban landscape problems.
 - Environmental Horticulture - Landscape Specialist (UCR)
 - This position would be involved with the identified agricultural issues of pest and disease management, environmental quality and resource conservation.
- UCR request for a CE Specialist in Urban Plant Pathology (UCR)
 - The position will address areas of high priority for UC-DANR, including the development of disease detection and monitoring systems, developing disease outbreak teams for exotic pathogens, facilitating efficient management of disease organisms in integrated management systems, disseminating information on recognition and control of diseases, and developing and extending plant disease management strategies that reduce risks to human health and safety.
- Ornamental/Nursery Crops Plant Pathology Specialist (UCD)
 - There has been a long-standing statewide need for service in this area. We currently do not have a coherent and focused CE program to adequately address landscape and nursery pathology.
- Urban Horticulture Specialist
 - This position would focus on those issues pertaining to plants, people and the urban environment. It could easily be focused on horticulture as well on physical/psychological/sociological aspects of plant and/or human health.

Facilities/Research/Extension Support

- Plant Disease and Disorder Diagnostics Laboratory
 - In recent years UC-DANR has lost, due to retirement, several AES faculty and CE Specialists who provided a much-needed service in diagnosing plant problems. Currently, there is no organized program to meet this need which places county advisors in a poor position to be helpful to their clientele in the area of plant problem diagnosis.
- Increased funding for collaborative research and education projects
 - Nationwide there are signs that environmental horticulture is being regarded as an area requiring more research and extension resources. One UC-DANR fund that has been quite successful especially in recent years is the Elvenia Slosson Ornamental

Horticulture Research Endowment. More programs like this (or a UC-DANR match to the existing fund) are needed.

Role of DANR Professionals and Volunteers (e.g., Master Gardeners)

On a statewide basis, volunteers (e.g., Master Gardeners) have not been utilized effectively to assist UC professionals in extending information. While some counties have active and thriving Master Gardener programs, what is needed is a statewide effort to coordinate the training and activities of the many volunteers so high-quality, science-based information can be delivered to those in need.

California initiated a pilot Master Gardener program in 1980 and by 1997 there were over 2,300 active Master Gardener volunteers supporting Cooperative Extension in 36 counties. During this period Master Gardeners donated nearly 360,000 volunteer hours to the University and in 1996 provided information to more than 200,000 individuals. (Master Gardener Program Synopsis 1980-1997, UCCE Publication.). This is an excellent extension resource for UC-DANR; Master Gardeners, a large group of enthusiastic individuals, can convey university research findings and knowledge in lay terms.

However, to do this effectively UC-DANR will need to invest in the necessary personnel for leadership and training programs.

The jobs that need to be done will include curriculum development, program coordination and leadership statewide, development of funding for programs and research, leadership in research opportunities in areas related to environmental horticulture, and finally, a program that is focused and issues-based.

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